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10/582,317	04/26/2007	David Jones	4810-75994-01	4955

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EXAMINER	
MI, QIUWEN	
ART UNIT	PAPER NUMBER
1655	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/582,317	JONES ET AL.	
	Examiner	Art Unit	
	QIUWEN MI	1655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28,30-34,45-49 and 52-58* is/are pending in the application.

4a) Of the above claim(s) *25-28,30-34,45-49 and 52-58* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's amendment in the reply filed on 5/19/08 is acknowledged. Claims 1-28, 30-34, 45-49, and 52-58 are pending. Claims 29, 35-44, 50, 51, and 59-65 are cancelled. Claims 25-28, 30-34, 45-49, and 52-58 are withdrawn as they are directed toward a non-elected invention groups or species. **Claims 1-24 are examined on the merits**.

Claim Rejections –35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 8-15, and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johansson et al (U, Fate and influence of western red cedar extractives in mechanical pulping, Wood Science and Technology 34, 389-401, 2000) in view of Diebold et al (US 4,100,016), as evidenced by Johansson et al (V, Holzforgchung 54: 246-254, 2000).

This is a new rejection necessitated by the Applicant's amendment filed on 11/14/2007.

Johansson et al (U, Wood Science and Technology 34, 389-401, 2000) teach methanol (polarity index 5.1) extractives from western red cedar (*Thuja plicata*) (plant order Cupressales) mechanical pulps and heartwood (trunk) (see Abstract). Johansson et al also teach that heartwood

chips were cut into slivers (solid phase of extracted plant materials) to maximize solvent penetration (mixing the plant materials with a liquid polar solvent to form an extraction mixture), soxhlet procedure was used. The pulps were extracted for 20-22 hours, methanol solvent was removed under reduced pressure (a type of distillation) (separating pregnant polar solvent liquid phase from solid plant materials, form a concentrated polar phase), fractionation was performed by suspending 0.5 g of the extractives in 200 ml of methyl tert-butyl ether (MTBE) (immiscible nonpolar solvent) (polarity index 2.5) with stirring for 48 h. The resulting brown solid was filtered off (solid phase separation)(see page 391, 1st paragraph). Johansson et al further teach that the extractive components of western red cedar heartwood contains (MTBE soluble components) lignans and tropolones (MTBE soluble components) (Table 4, page 398). Johansson et al also suggest that insoluble polymers formed from plicatic acid during refining.

Johansson et al (U, Wood Science and Technology 34, 389-401, 2000) do not teach the claimed extraction period, nor do Johansson et al explicitly teach extracting lignins from *Thuja plicata.*

As evidenced by Johansson et al (V, Holzforgchung 54: 246-254, 2000), the color of the extractable heartwood of *Thuja plicata* is primarily due to a lignin-lignan co-polymer, with the lignan present as a minor component (see page 246, right column, 1st paragraph). Thus it is inherent that lignins and tropolones in *Thuja plicata* will be extracted by methanol, and they will be soluble in the non-polar solvent. Also it is inherent that methanol will extract a proportion of the polar molecules and at least 50% of the tropolones in the plant materials; and partitioned polar solvent phase comprises plicatic acid.

Diebold et al teach extracting lignin using batch extraction vessel containing a charge of wood chips (col 1, lines 48-55). Diebold et al also teach the invention obtains separation and recovery of the cellulose and lignin fractions in a highly effective manner such that there is no appreciable air or stream pollution or solid waste resulting from the process (col 1, lines 16-23).

Therefore, it would have been *prima facie* obvious for one of ordinary skill in the art at the time the invention was made to use the batch extraction from Diebold et al since Diebold et al teach that it obtains separation and recovery of the cellulose and lignin fractions in a highly effective manner such that there is no appreciable air or stream pollution or solid waste resulting from the process.

It would also have been *prima facie* obvious for one of ordinary skill in the art at the time the invention was made to use the claimed extraction period in the current invention as the result-effective adjustment in conventional working parameters is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan, which is dependent on the amount of the plant material, solvent and extracting temperature being used.

From the teachings of the references, it is apparent that one of the ordinary skills in the art would have had a reasonable expectation of success in producing the claimed invention.

Thus, the invention as a whole is *prima facie* obvious over the references, especially in the absence of evidence to the contrary.

Claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johansson et al (U, Fate and influence of western red cedar extractives in mechanical pulping, Wood Science and Technology 34, 389-401, 2000), in view of Delong et al (A*, US 4,966,650), further in view

of Naae et al (B*, US 6,207,808) and Diebold et al (US 4,100,016), as evidenced by Johansson et al (V, Holzforgchung 54: 246-254, 2000).

This is a new rejection necessitated by the Applicant's amendment filed on 11/14/2007.

Johansson et al (U, Wood Science and Technology 34, 389-401, 2000) teach methanol (polarity index 5.1) extractives from western red cedar (*Thuja plicata*) (plant order Cupressales) mechanical pulps and heartwood (trunk) (see Abstract). Johansson et al also teach that heartwood chips were cut into slivers (solid phase of extracted plant materials) to maximize solvent penetration (mixing the plant materials with a liquid polar solvent to form an extraction mixture), soxhlet procedure was used. The pulps were extracted fro 20-22 hours, methanol solvent was removed under reduced pressure (a type of distillation) (separating pregnant polar solvent liquid phase from solid plant materials) (form a concentrated polar phase), fractionation was performed by suspending 0.5 g of the extractives in 200 ml of methyl tert-butyl ether (immiscible nonpolar solvent) (polarity index 2.5) with stirring for 48 h. The resulting brown solid was filtered off (solid phase separation (page 391, 1st paragraph). Johansson et al further teach that the extractive components of western red cedar heartwood contains (MTBE soluble components) lignans and tropolones (MTBE soluble components) (Table 4, page 398). Johansson et al also suggest that insoluble polymers formed from plicatic acid during refining.

Johansson et al (U, Wood Science and Technology 34, 389-401, 2000) do not teach using nonpolar solvent dichloromethane, the claimed extraction period, or additional wash of nonpolar solvent diethyl ether, nor do Johansson et al explicitly teach extracting lignins from *Thuja plicata.*

As evidenced by Johansson et al (V, Holzforgchung 54: 246-254, 2000), the color of the extractable heartwood of *Thuja plicata* is primarily due to a lignin-lignan co-polymer, with the lignan present as a minor component (page 246, right column, 1st paragraph). Thus it is inherent that lignins and tropolones in *Thuja plicata* will be extracted by methanol, and they will be soluble in the non-polar solvent. Also it is inherent that methanol will extract a proportion of the polar molecules and at least 50% of the tropolones in the plant materials; and partitioned polar solvent phase comprises plicatic acid.

Delong et al disclose a method for fractionation of lignins (see Title). Delong et al teach that the whole aqueous eluant is sent to a liquid-liquid extractor containing dichloromethane to remove the water-soluble lignin components (col 6, lines 40-45). Delong et al further teach that filtration and recovery by evaporation of the dichloromethane from the filtrate yields lignin D.

Naae et al disclose a method for preparation of lignin phenol surfactant (see Title). Naae et al teach that lignin phenol may be recovered from the reaction mixture with an organic solvent that is capable of solubilizing lignin phenol, such as diethyl either etc.

Diebold et al teach extracting lignin using batch extraction vessel containing a charge of wood chips (col 1, lines 48-55). Diebold et al also teach the invention obtains separation and recovery of the cellulose and lignin fractions in a highly effective manner such that there is no appreciable air or stream pollution or solid waste resulting from the process (col 1, lines 16-23).

Therefore, it would have been *prima facie* obvious for one of ordinary skill in the art at the time the invention was made to use the batch extraction from Diebold et al since Diebold et

al teach that it obtains separation and recovery of the cellulose and lignin fractions in a highly effective manner such that there is no appreciable air or stream pollution or solid waste resulting from the process.

It would also have been *prima facie* obvious for one of ordinary skill in the art at the time the invention was made to use dichloromethane to extract lignins of Delong et al in the current invention since Delong et al teach extracting lignin using dichloromethane; It would also have been *prima facie* obvious for one of ordinary skill in the art at the time the invention was made to use diethyl either to wash non-polar solvent phase in Naae et al in the current invention since Naae et al teach diethyl either is capable of solubilizing lignins. Since all the references cited yielded beneficial results in preparing lignins, one of ordinary skill in the art would have been motivated to make the modifications. In addition, it is well known in the art that dichloromethane, diethyl either, and methyl tert-butyl ether all have similar polarity index and are used interchangeably as non-polar solvents. Regarding the limitation to the extraction period, the result-effective adjustment in conventional working parameters is deemed merely a matter of judicious selection and routine optimization which is well within the purview of the skilled artisan, which is dependent on the amount of the plant material, solvent and extracting temperature being used.

From the teachings of the references, it is apparent that one of the ordinary skills in the art would have had a reasonable expectation of success in producing the claimed invention.

Thus, the invention as a whole is *prima facie* obvious over the references, especially in the absence of evidence to the contrary.

Applicant describe the procedure of soxhlet extractor in the cited Wood Science article (page 10) and concludes that "The overall process of Soxhlet extraction is not therefore a batch extraction process wherein the batch extraction mixture of solvent and plant materials is maintained under extraction conditions to extract tropolones into the batch of solvent. Rather, it is a sequential series of extractions with refreshed, heated and distilled, solvent, i.e. many effective batches of solvent" (page 11, 1st paragraph). Applicant further states that "The surprising efficiency of the commercial scale batch extraction process of the invention is reflected in the claimed recovery of at least 50% of the tropolones in the plant materials into a batch of polar solvent, followed by partitioning of the tropolones substantially into a nonpolar solvent. It is respectfully submitted that there is nothing in the cited art that would provide a basis for a reasonable expectation that one could adjust batch extraction conditions and partition conditions to successfully achieve this surprising result" (page 11, last paragraph bridging page 12).

Applicant's arguments have been fully considered and are persuasive. Therefore, the previous 103 rejections have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Diebold et al.

Applicant states that "This Soxhlet procedure is to be contrasted with the procedures set out in present Example 1, which is a batch process involving two sequential batches of fresh methanol solvent, followed by extraction from the methanol into the nonpolar solvent dichloromethane to form Extract 1A, which is then heated to obtain Purified Solid Extract 1A.

As set out in the paragraph preceding Table 3, Purified Extract 1A was about 6% by weight of the original plant material. As set out in Table 3, that extract was 14-17% by weight identifiable tropolones: beta thujaplicin (4-5%) and gamma thujaplicin (10-12%). The overall extraction of tropolones evidenced by Example 1 is therefore approximately 0.8-1% by weight of the original plant material (14-17% of 6%)" (page 11, 2nd paragraph). Applicant indicates that "Johansson et al (U, Wood Science and Technology 34, 389-401) teaches that extraction of 1 kg of Oven Dried (OD) heartwood using the Soxhlet method (with approximately 80 effective sequential extraction cycles) yielded 142g of extract. 4% of that 142g is reported to be tropolones (page 398). This means that 5.68g of tropolones per kg of OD heartwood (or 0.568% w/w) are extracted by the Soxhlet method taught by that reference" (page 11, 3rd paragraph). Applicant argues that "Example 1 of the present application accordingly illustrates the surprising result that tropolones constituting 0.8-1% by weight of an original plant material may be obtained in a commercial scale batch extraction process that involves a methanol extraction step followed by partition of the tropolones into a dichloromethane nonpolar solvent. In contrast, the cited Wood Science article teaches that exhaustive extraction by the Soxhlet process yields tropolones constituting only approximately 0.57% of the original plant material" (page 11, 2nd paragraph from the bottom).

This is not true. On page 398, Table 4, Johansson et al explicitly list 4% yield of tropolones from western red cedar heartwood, which is much higher than the 0.8-1% yield alleged by the Applicant. The calculated result 0.568% by the Applicant based on 142 g does not make any sense.

Applicant argues that "In addition to failing to provide a basis for any reasonable expectation of success in methods as claimed, the cited art does not suggest any motivation for optimizing a process to recover at least 50% of the tropolones from a plant material. The Holzforschung paper in particular explicitly teaches that lignans, rather than tropolones, are responsible for the (undesired) coloration of cedar pulps. The cited art teaches that tropolones are substantially destroyed by the pulping process, in effect teaching that there is no need to develop commercially-relevant techniques for optimal tropolone extraction" (page 12, 2nd paragraph).

This is not true. The Holzforschung paper explicitly teaches that "a major difference between red cedar and other softwoods is the content and structure of the extractives, which constitute a high proportion of the wood and are responsible for its characteristic odor, colour and durability. These extractives are composed of tropolones, which are also found in other species, and lignans, which are unique to western red cedar" (page 246, 1st column, 2nd paragraph).

Applicant argues that there is no specific suggestion or teaching in the references. All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of invention. In addition, KSR forecloses the argument that a specific teaching, suggestion, or motivation is required to support a finding of obviousness. See the recent Board decision Ex parte Smith, --USPQ2d--, slip op. at 20 (Bd. Pat. App.& Interf. June 25, 2007) (citing KSR, 82 USPQ2d at 1396) (available at http://www.uspto.gov/web/offices/dcom/bpai/prec/fd071925.pdf).

Applicant's arguments have been fully considered but they are not persuasive, and therefore the rejections in the record are maintained.

Conclusion

No claim is allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qiuwen Mi whose telephone number is 571-272-5984. The examiner can normally be reached on 8 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terry McKelvey can be reached on 571-272-0775. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

QM

/Michele Flood/

Primary Examiner, Art Unit 1655